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PLEASE CHECK FOR CHANGE INFORMATION AT THE REAR OF THIS MANUAL.

This manual supports the following TEKTRONIX products:

8550 Options	8540 Options	Products
2K	2K	8300E15
3P	3P	8300P15
3X	3X	8300P16
		8300P15 Option 01
		8300P16 Option 01

8500
MODULAR MDL SERIES
8086/8088
EMULATOR PROCESSOR
PROTOTYPE CONTROL PROBES
INSTALLATION
SERVICE

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077

070-3775-00
Product Group 61

Serial Number _____

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PREFACE

ABOUT THIS MANUAL

This manual tells how to install the 8086/8088 Emulator Processor boards and prototype control probe in an 8500-series TEKTRONIX microcomputer development system.

Throughout this manual, all references to a "microcomputer development system" refer to the 8301 Microprocessor Development Unit or the 8540 Integration Unit. All references to the "8086/8088 Emulator Processor" or to the "emulator" refer to the 8086/8088 Emulator Processor boards plus either the 8086 or the 8088 Prototype Control Probe.

MANUAL ORGANIZATION

The 8086/8088 Emulator Processor Installation Manual is divided into four sections:

- Section 1 contains general information about the emulator processor boards and prototype control probe.
- Section 2 contains information about jumpers.
- Section 3 provides detailed installation procedures for the emulator processor boards and the prototype control probe.
- Section 4 describes procedures used to verify proper functional performance of the emulator processor.

GENERAL INFORMATION

REVISION HISTORY

Revision history information is included in the text and illustrations as they are revised and reprinted. Original manual pages are identified with an '@' symbol at the bottom inside corner of the page. When existing pages are revised, the '@' symbol is replaced with a revision code and date. New pages added to a section, whether they contain old, new, or revised information, will be identified with the '@' symbol and a date.

CHANGE INFORMATION

Change information is located at the back of this manual in the CHANGE section. Change information should be entered into the body of the manual when the manual is received.

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OPERATORS SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

TERMS

In This Manual

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

As Marked on Equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

SYMBOLS

As Marked on Equipment

DANGER high voltage.

Protective ground (earth) terminal.

ATTENTION - Refer to manual.

SAFETY PRECAUTIONS

Grounding the Product

The product is grounded through the grounding conductors in the interconnecting cables. To avoid electrical shock, plug the supporting system's power cord into a properly wired receptacle. A protective ground connection by way of the grounding conductor in the system power cord is essential for safe operation.

Use the Proper Fuse

To avoid fire hazard, use only the fuse specified in the parts list for your product. Be sure the fuse is identical in type, voltage rating, and current rating.

Refer fuse replacement to qualified service personnel.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an atmosphere of explosive gases.

Do Not Remove Covers or Panels

To avoid personal injury, do not remove covers or panels from this product. Do not operate the product without the covers and panels properly installed.

SERVICING SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

(Refer also to the preceding Operators Safety Summary)

DO NOT SERVICE ALONE

Do not perform internal service or adjustment on this product unless another person capable of rendering first aid and resuscitation is present.

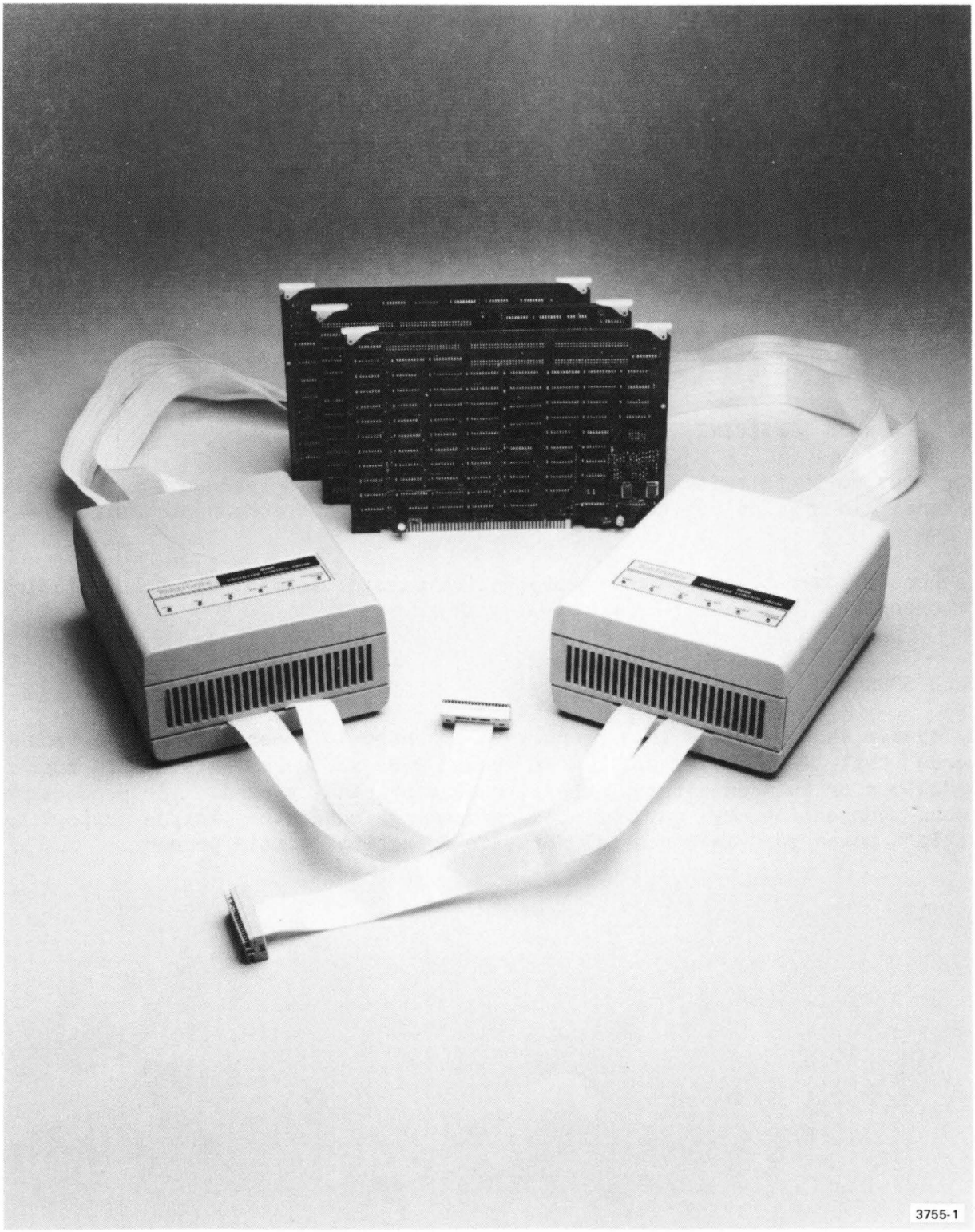
USE CARE WHEN SERVICING WITH POWER ON

Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.

POWER SOURCE

The system that supports this product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the supporting system's power cord is essential for safe operation of this product.



8086/8088 Emulator Processor boards with the 8086 and 8088
Prototype Control Probes.

Section 1

GENERAL INFORMATION

INTRODUCTION

The 8086/8088 Emulator Processor is an accessory designed to function as part of the 8301 Microprocessor Development Unit (MDU) or the 8540 Integration Unit (IU). The 8086/8088 Emulator Processor provides in-circuit emulation for an 8086 or 8088 device.

This manual contains procedures for installing the 8086/8088 Emulator Processor in the 8301 MDU or the 8540 IU. This manual also contains performance verification procedures.

For user information about the 8086/8088 Emulator Processor, refer to your System Users Manual and to the 8086/8088 Emulator Specifics supplement. Servicing information is contained in the 8086/8088 Emulator Processor Prototype Control Probes Service Manual.

CAUTION

The 8086 or 8088 device contained within the prototype control probe is extremely static-sensitive. Although this device is protected from static discharge damage when installed in the emulator processor, static discharge may interrupt the normal operation of the emulator if the following precautions are not taken:

1. Avoid touching the prototype control probe cables and 40-pin plug, whenever possible, while the emulation system is operating.

2. Under some conditions, you may find it necessary to use an anti-static wrist strap while operating this equipment.

MODES OF OPERATION

The 8086/8088 Emulator Processor operates in one of three emulation modes:

MODE 0 System mode. Mode 0 is used to develop software for a prototype circuit based on an 8086 or 8088 device. In mode 0, the microcomputer development system acts as a stand-alone 8086- or 8088-based microcomputer. Thus, the prototype software is stored in your development system's program memory, and the 8086/8088 Emulator Processor provides the I/O facilities and clock. Figure 1-1A illustrates mode 0 operation.

MODE 1 Partial emulation mode. Mode 1 is used to develop some of the hardware functions of the prototype circuit. In mode 1, the prototype control probe is connected between the 8086/8088 Emulator Processor boards and the microprocessor socket of the prototype circuit. In this way, the prototype's memory, I/O, and clock are exercised, while the development system retains full control over the prototype system.

In mode 1, the memory mapping feature allows various portions of the prototype software to be stored in prototype memory while the rest of the prototype software remains in the development system's program memory. Figure 1-1B illustrates mode 1 operation.

MODE 2 Full emulation mode. Mode 2 is used in the final software/hardware integration phases of prototype system design, or is used when troubleshooting hardware with known-good software. The only difference between mode 1 and mode 2 is that here, the entire prototype program is stored in the prototype's memory. Figure 1-1C illustrates mode 2 operation.

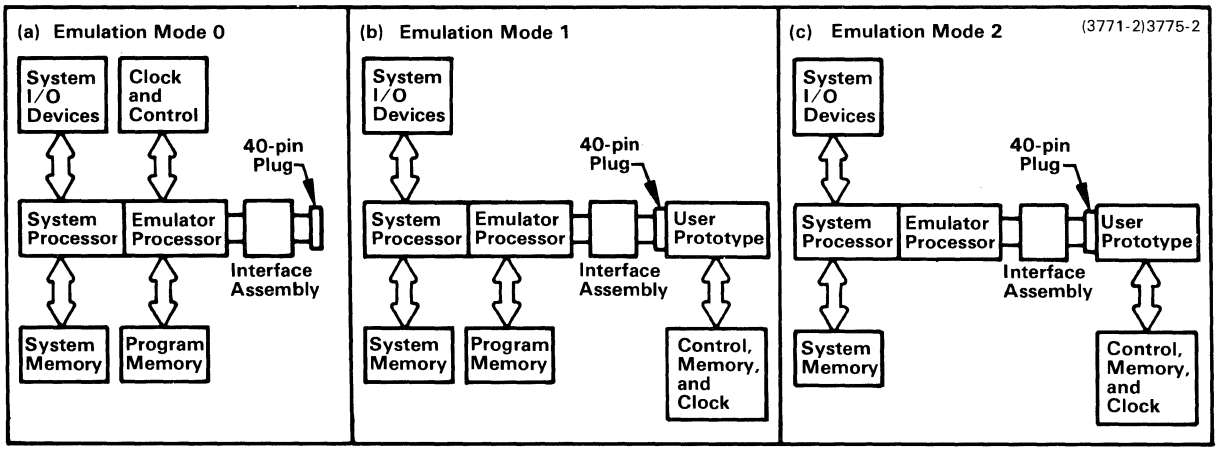


Fig. 1-1. Emulation modes 0, 1, and 2.

EMULATOR PROCESSOR OVERVIEW

The 8086/8088 Emulator Processor consists of three circuit boards and either an 8086 or 8088 Prototype Control Probe. The three circuit boards plug into the microcomputer development system mainframe, and the prototype control probe attaches to one of the three circuit boards.

The 8086/8088 Emulator Processor serves two purposes in the microcomputer development system. First, the emulator has the ability to run a program written specifically for the target microprocessor. With the help of other boards in the system, the emulator processor can check the program for run-time errors or program logic errors. Second, with the prototype control probe connected between the emulator processor boards and the prototype circuit, the prototype circuit can be debugged and stepped through the final stages to design completion.

The 8086/8088 Emulator Processor emulates the operation of a target microprocessor device that will be used in the final version of a prototype system. The emulator processor responds to software in the same way as the target microprocessor, and also allows software debugging.

EMULATOR PROCESSOR BOARDS

The three 8086/8088 Emulator Processor boards plug into the main interconnect board of the system mainframe. These boards are designated as board I, II, and III. The functions of each of these boards are as follows:

Board I contains breakpoint circuitry, clocks, address and data strobes, and the TTA connectors.

Board II contains the address latch and buffer, the prototype control probe interface, mainframe interface timing, the queue, Mapping RAM, and Relocation RAM.

Board III contains the data bus interface, PROM, Function RAM, Command Port, Status Port, and Master Register.

PROTOTYPE CONTROL PROBE

The prototype control probe allows an emulator processor to functionally replace the microprocessor of a prototype system. The probe is the interface between the emulator processor boards and the prototype circuit's microprocessor socket.

The prototype control probe consists of:

1. Two 6-foot ribbon cables that attach to a cable termination board, which plugs into 8086/8088 Emulator Processor board II.

2. An interface assembly, which contains the Buffer board, the Control board, the Power Supply board, and an 8086 or 8088 Mobile Microprocessor board.

3. A 40-pin dual in-line plug that inserts in the microprocessor socket of the prototype circuit. The plug is connected to the interface assembly via two 1.5 foot ribbon cables.

Figure 1-2 shows 8086/8088 Emulator Processor interconnections.

Prototype Control Probe LEDs

Six indicator LEDs are visible on the prototype control probe's interface assembly. When lit, these LEDs indicate the following conditions:

RESET -- The prototype circuit has asserted the RESET line and caused the processor to stop current activity.

TEST -- The prototype circuit has asserted the TEST line. (This LED is always lit in mode 0.)

WAIT -- The processor is in a wait state.

BUS ACK -- The processor is acknowledging a bus request.

SELECT -- The emulator processor has been selected.

PROTOTYPE POWER -- The prototype circuit's +5 V supply is present.

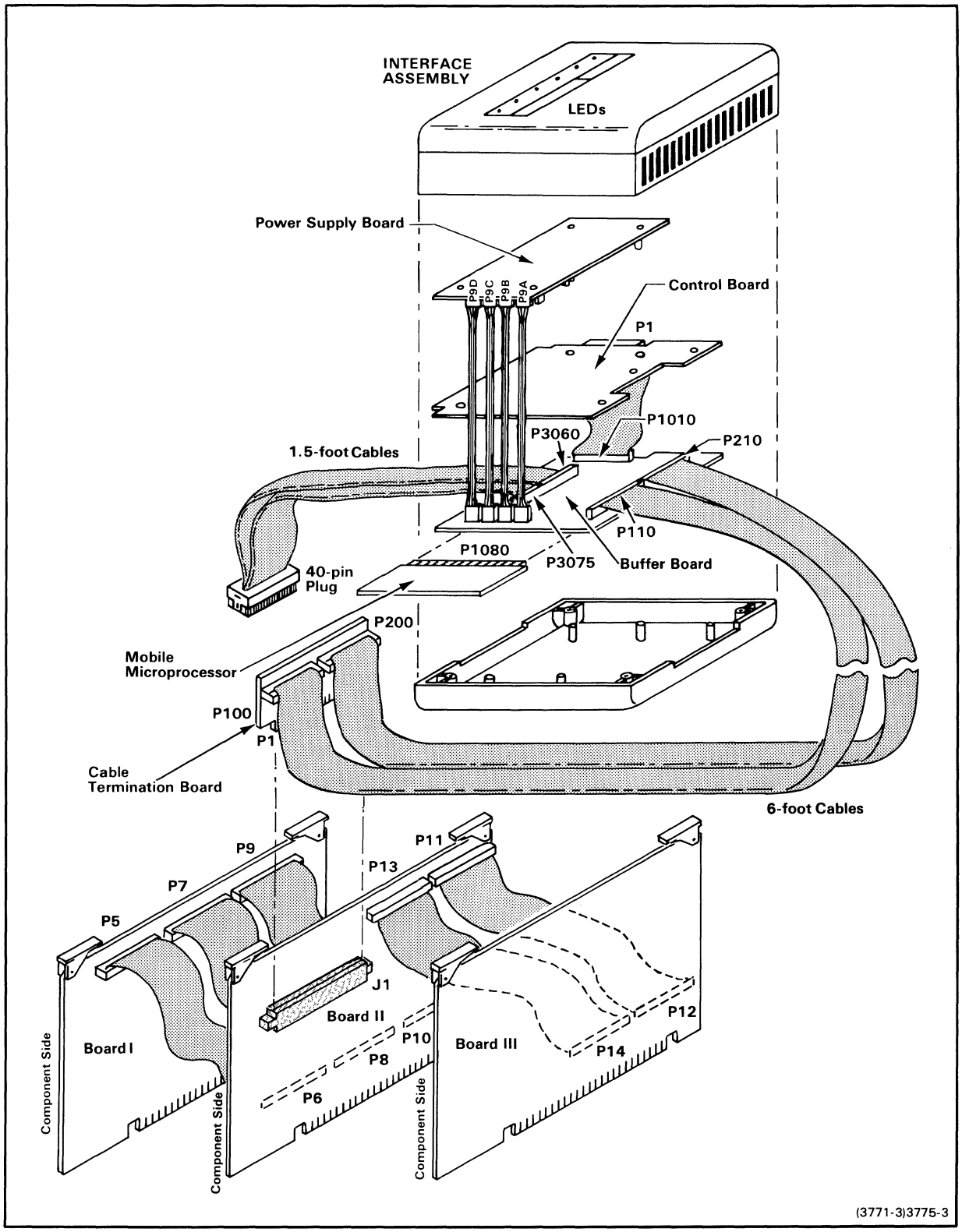


Fig. 1-2. 8086/8088 Emulator Processor interconnections.

SPECIFICATIONS

Table 1-1
8086/8088 Emulator Processor
Electrical Characteristics

Characteristics	Performance Requirement	Supplemental Information
Supply Voltage	+5.2 Vdc +1%/-2%	
	+12.0 Vdc ± 5%	
	-12.0 Vdc ± 5%	-12.0 Vdc used by prototype control probe only
Current (typical)		+5.2 Vdc @ 10.22 A
		+12.0 Vdc @ 1.65 A
		-12.0 Vdc @ 0.40 A
Power Dissipation		80 W (max.) Selected
		65 W (max.) Not Selected

Table 1-2
8086/8088 Emulator Processor
Environmental Characteristics

Characteristics	Description
Temperature	
Operating	0° C to 50° C (32 F to 122° F)
Storage	-55° C to +75° C (-67° F to +167° F)
Relative Humidity	90% maximum non-condensing
Altitude	
Operating	5 000 m (15,000 ft) maximum
Storage	16 400 m (50,000 ft) maximum

Section 2

JUMPERS

INTRODUCTION

The 8086/8088 Emulator Processor boards and prototype control probe contain user-selectable jumpers. This section describes the function and location of each jumper. Only user-selectable jumpers are described here; all other jumpers are strictly for factory use.

This section consists of three parts: the first part describes jumpers located on the emulator processor boards, the second part describes jumpers located in the prototype control probe, and the third part describes jumpers, straps, and switches located on the 32K System/Program Memory and 64K/128K Program Memory boards.

NOTE

For all jumpers, position 1 is indicated by an arrow on the circuit board, unless otherwise noted.

JUMPERS ON THE 8086/8088 EMULATOR PROCESSOR BOARDS

There are four user-selectable jumpers located on 8086/8088 Emulator Processor boards I and II. (There are no jumpers located on board III.) See Fig. 2-1 and Fig. 2-2 for jumper locations on boards I and II, respectively. Note that the jumper positions shown in these figures are the factory settings.

EMULATOR BOARD I JUMPERS

P4029 Prototype clock match. The position at which this jumper is set depends on the speed of the prototype circuit's clock. The jumper must be set to the "HI" position if the clock is operating in the 4.5--8.0 MHz range (normal jumper position), or to the "LO" position if the prototype clock is operating in the 2.0--4.5 MHz range.

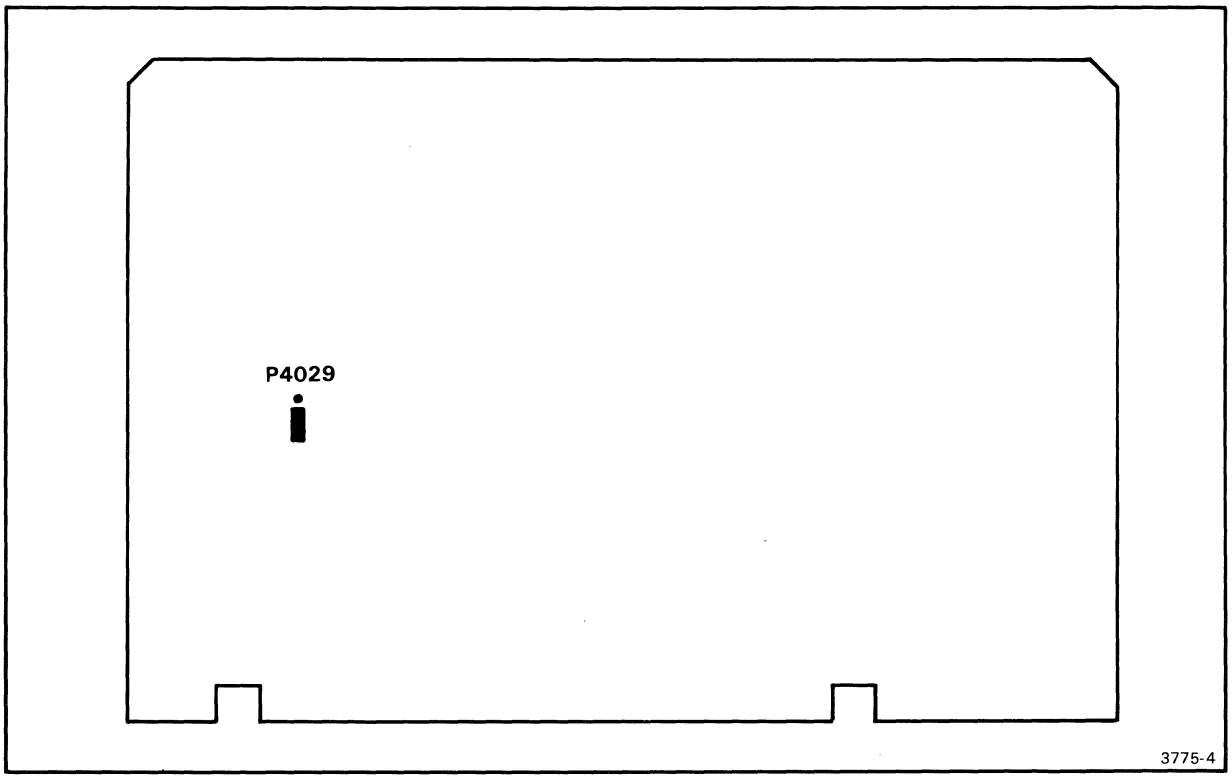


Fig. 2-1. 8086/8088 Emulator Processor board I jumper locations.

EMULATOR BOARD II JUMPERS

P3106 Write protect break option. When this jumper is set to position 2 ("YES"), the emulator will cause a break condition if you attempt to write to a protected area of memory. This is the normal position.

When this jumper is set to position 1 ("NO"), no break condition will occur if you attempt to write to protected memory.

P3505 Wait state option select. The jumper is used to select one of two wait state sources or used to disable wait states.

When this jumper is set to position 2 ("DYN"), wait states are inserted under program control during program memory accesses. (Note that under program control, the default condition is zero wait states.) This is the normal jumper position.

When this jumper is set to position 3 ("ALLF"), no wait states are inserted during program memory accesses.

When this jumper is set to position 1 ("ALLS"), wait states are inserted (as designated by jumper P7005) during program memory accesses. This position is mainly used for diagnostic purposes.

P7005 Wait state generator. The jumper selects the number of wait states to be inserted when jumper P3505 is set to position 1. (Note that jumper P7005 can also select the number of wait states to be inserted when jumper P3505 is set to position 2. This occurs only if you are accessing memory that you have allocated as "slow" with the AL -S command.)

P7005 allows up to seven wait states to be inserted during program memory accesses.

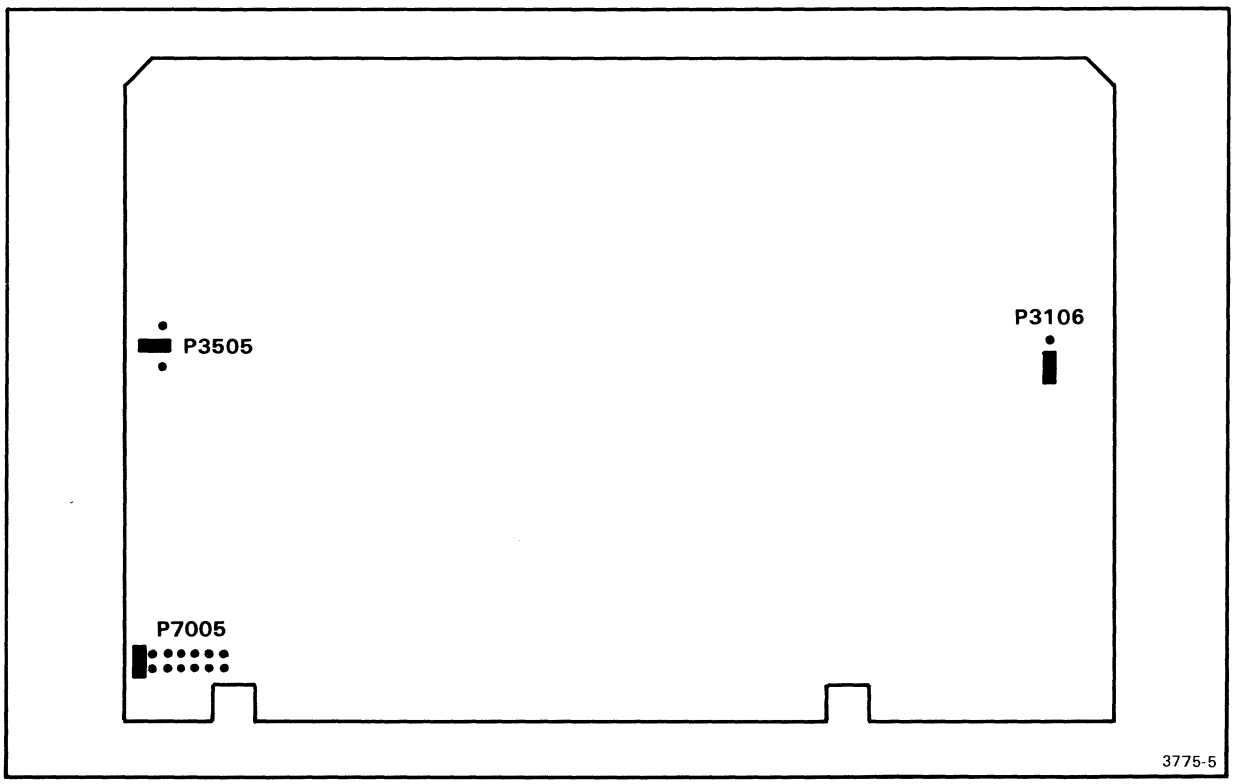


Fig. 2-2. 8086/8088 Emulator Processor board II jumper locations.

JUMPERS IN THE PROTOTYPE CONTROL PROBE

There are 22 user-selectable jumpers located on the Control and Buffer boards in the prototype control probe. (The Control and Buffer boards are identical for both types of probes.) See Fig. 2-3 and Fig. 2-4 for jumper locations on the Control and Buffer boards, respectively. Note that the jumper positions shown in these figures are the factory settings.

In order to access these jumpers you must disassemble the housing of the interface assembly and, in most cases, also remove the Control board located inside the housing. Refer to the discussion, "Accessing the Prototype Control Probe Jumpers", later in this section.

CONTROL BOARD JUMPERS

P2 Outread option. Basically, the outread option enables data out to the prototype circuit that has been read from program memory or mapped-in memory. Sending this data to the prototype allows a prototype coprocessor (such as the 8087) to follow program flow.

When this jumper is in position 1, the outread option is not selected and the emulator functions normally. This is the normal jumper position.

When this jumper is set in position 2, the outread option is enabled. Position 2 must be selected whenever a coprocessor is used in the prototype circuit during mode 1 operation. Note that in order to use the outread option, the prototype circuit's data buffers must be designed to disable during outreads.

P3 DMA disable option. When this jumper is set to position 2, DMA (RQ/GT) operations while the emulator is in mode 3 are enabled. (Mode 3 is not a true emulation mode, but encompasses all emulator activity that occurs while the emulator is not executing a prototype program.) This is the normal position and must be selected if DMA operations continuously need to be used by the prototype circuit (for CRT refresh, for example).

When this jumper is set to position 1, all DMA operations during mode 3 are disabled. This jumper setting ensures stable memory data or status during mode 3 and must be selected if you want to use the D (Dump) or EX (Examine) command to inspect memory affected by DMA operations.

P4 Hold timeout option. When this jumper is set to position 2, the emulator will wait indefinitely for the current DMA cycle to end before any break request is honored. This is the normal jumper position.

When this jumper is set to position 1, any break request will start a timeout that lasts for about 0.5 second of DMA access. At the end of the timeout, the break request is honored. If the jumper is set to this position, jumper P3 must also be set to position 1.

P5 Clock deskewer enable. When this jumper is set to position 1 ("DESKEW"), the clock deskewer circuit is enabled. This is the normal position. If you select this position, be sure to set jumper P8 to the appropriate position.

When this jumper is set to position 2 ("BYPASS"), the clock deskewer is disabled. This position should be selected only if the prototype clock is operating at something other than a steady state 33% duty cycle.

P8 Deskewer prototype clock match. The position at which this jumper is set depends on the speed of the prototype circuit's clock. The jumper must be set to the "HI" position if the clock is operating in the 4.5--8.0 MHz range (normal jumper position), or to the "LO" position if the prototype clock is operating in the 2.0--4.5 MHz range.

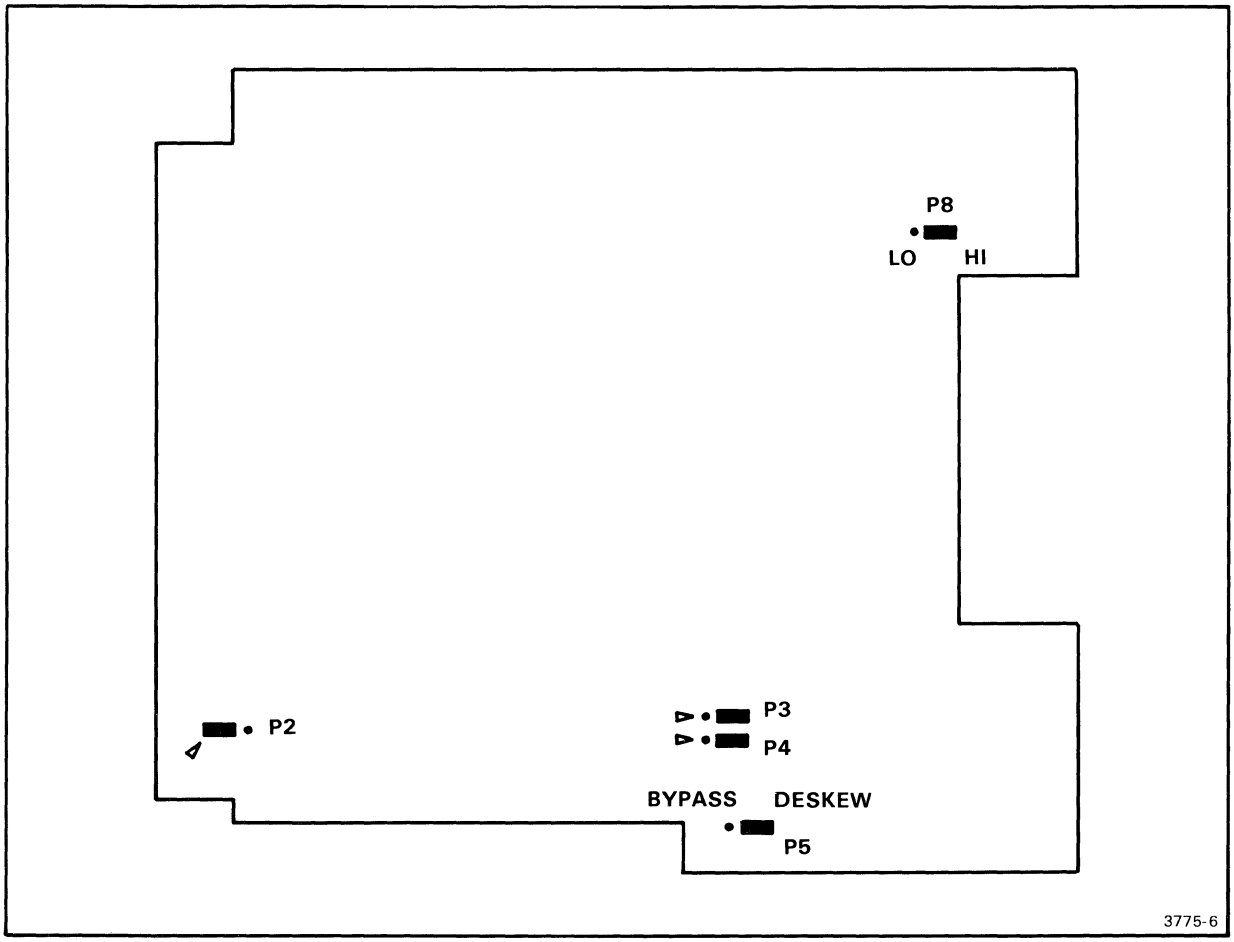


Fig. 2-3. Control board jumper locations.

BUFFER BOARD JUMPERS

P6012 Synchronize RESET option. This option synchronizes the RESET signal from the prototype circuit with emulator bus cycles in order to minimize the likelihood of writing randomly to memory.

When this jumper is set to position 1, this option is disabled and the RESET signal from the prototype circuit is transparently emulated. This is the normal position.

When this jumper is set to position 2, the synchronize RESET option is enabled.

P7072 Prototype READY control. When this jumper is set to position 2, the prototype's READY signal does not control mode 1 access to program memory. This is the normal jumper setting and should be selected for full-speed operation of program memory while in mode 1.

Position 2 should also be selected if the prototype circuit is in a system (such as a Multi-Bus) where nonexistent memory accesses produce a not-ready status. In such a case, the READY line would become stuck and the system would hang. (This feature is necessary because a mode 1 program memory access of a particular address also produces an access of the same address in prototype memory. However, the data accessed in prototype memory under these circumstances is never read.)

When this jumper is set to position 1, the prototype's READY signal controls mode 1 access to program memory. This position may be needed if prototype memory control circuitry requires that wait states be inserted to avoid memory or memory controller destructive states. (Again, this feature is necessary because of memory bus cycles that occur simultaneously in program memory and prototype memory.)

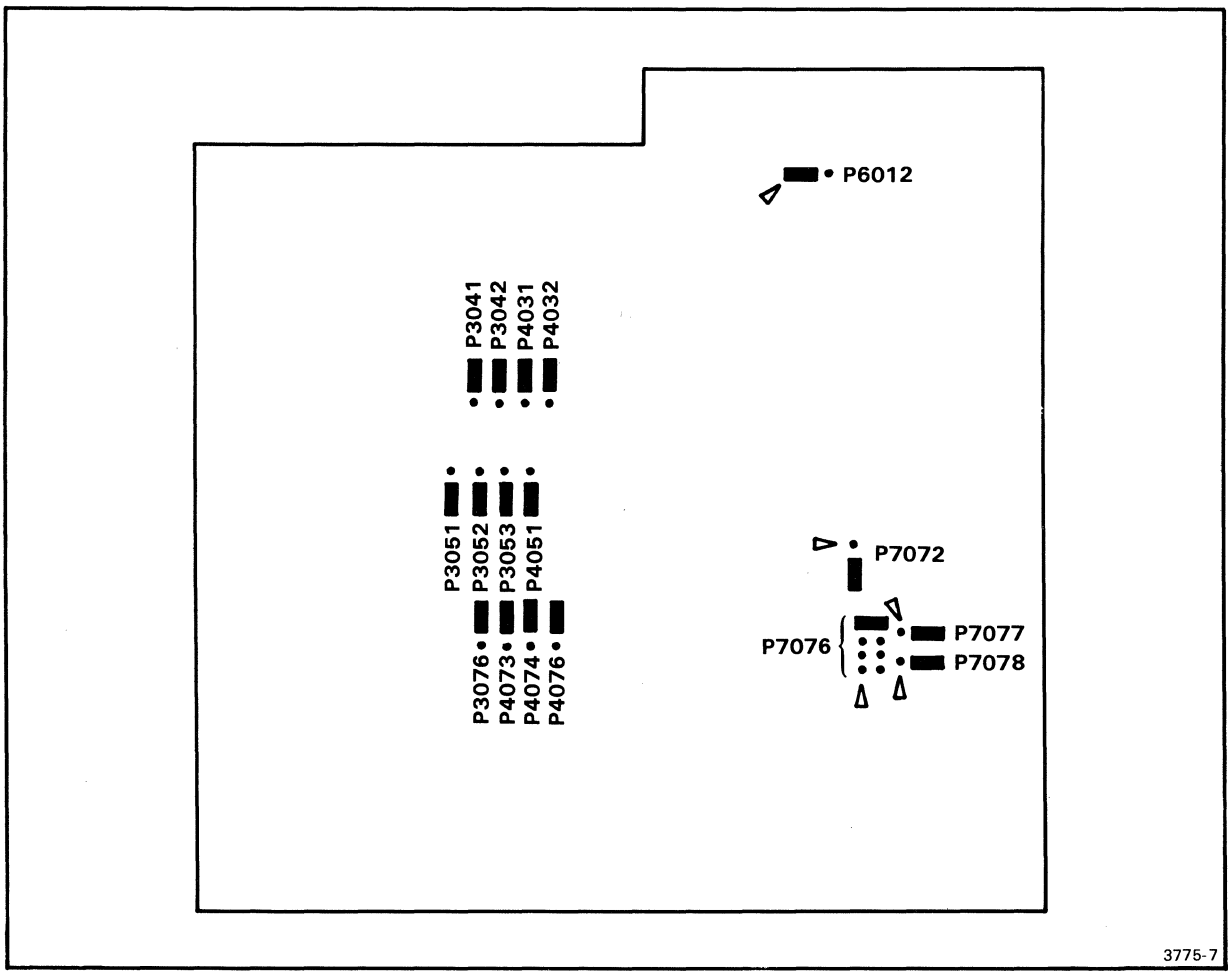


Fig. 2-4. Buffer board jumper locations.

P7076 READY fault/timeout wait state select. These four sets of pins allow you to select the number of wait states before a READY error. The position of this jumper must be selected in conjunction with jumpers P7077 and P7078. Refer to Table 2-1 for a look at the functions produced by various combinations of these three jumpers.

P7077 READY timeout option. This option forces the prototype's READY signal after a specified number of wait states (as selected by P7076).

When this jumper set to position 1, the READY timeout option is disabled, and any number of consecutive wait states is allowed before READY can become true. This is the normal position.

When this jumper is set to position 2, the READY timeout option is enabled. If your prototype is in a Multi-Bus system, this setting may be used in conjunction with the prototype READY control option (P7072 set to position 1) in order to avoid hanging the bus when addressing nonexistent prototype memory.

Refer to Table 2-1 for more information on the function of this jumper.

P7078 Break on READY fault option. When this jumper is set to position 2, a READY fault will not produce a break and will not be reported to you. This is the normal jumper position.

When this jumper is set to position 1, a READY fault will produce a break, force the READY line true, and cause the operating system to display an error message.

Refer to Table 2-1 for more information on the function of this jumper.

Table 2-1
READY Fault/Timeout Jumpers

Jumper Positions			Function Produced
P7076	P7077	P7078	
0	Don't Care	Don't Care	Fully transparent emulation of prototype READY signal. The emulator will wait indefinitely for READY to turn true.
n(a)	2	2	After a READY error, the emulator will timeout after n wait states and force READY true. However, the emulator will not create a break or produce an error message.
n(a)	1	2	Fully transparent emulation of prototype READY signal. The emulator will wait indefinitely for READY to turn true (except any other break condition will force READY true after n wait states and break with no error message).
n(a)	x	1	After a READY error, the emulator will timeout after n wait states and force READY true. The emulator will also create a break and produce an error message.

(a) Any jumper setting other than 0.

Dummy Address Jumpers

There are twelve jumpers on the Buffer board that specify a 256-byte block of memory to which pseudo code-fetches can be directed. This feature is necessary because system accesses to prototype memory or I/O may cause dummy read cycles. Generally, the only precaution you must take when setting the dummy address jumpers is to avoid specifying any memory-mapped I/O addresses.

Table 2-2 lists the dummy address jumpers and their corresponding address lines. Note that with each jumper, position 1 specifies a low level and position 2 specifies a high level. The normal position for each of the dummy address jumpers is position 1.

Table 2-2
Dummy Address Jumpers

Jumper	Address Line
P3051	DA8
P4051	DA9
P3041	DA10
P3053	DA11
P3042	DA12
P3052	DA13
P4031	DA14
P4032	DA15
P4073	DA16
P4074	DA17
P3076	DA18
P4076	DA19

ACCESSING THE PROTOTYPE CONTROL PROBE JUMPERS

The following procedure tells how to disassemble the interface assembly in order to gain access to jumpers in the prototype control probe.

1. Lay the interface assembly top-side down on a flat surface, and orient the assembly so that the 1.5-foot cable is facing you.

2. Remove the four screws that secure the top cover of the interface assembly's plastic housing.

3. Gently raise the bottom cover of the plastic housing off of the midsection and top cover, and flip over to its left side. Be careful not to pull any of the cables loose that connect the bottom cover to the rest of the interface assembly.

4. On the now-exposed underside of the bottom cover, remove the six self-locking nuts that secure the metal shield, then lift off the shield.

5. Remove the six metal spacers. Carefully lift the top circuit board (the Control board) from its supporting posts, and then flip the board over on its connecting cable so that both the Control and Buffer boards are now exposed.

32K SYSTEM/PROGRAM MEMORY BOARD JUMPERS, STRAPS, AND SWITCHES

When the 8086/8088 Emulator Processor is installed, two jumpers, one strap, and one set of switches must be set on each 32K System/Program Memory board (in the Program section of your development system). Refer to your development system's installation manual for information on the location and function of these jumpers and switches.

W5011 Delayed read strap. Cut the cuttable run between pins 1 and 2, and then solder a strap between pins 2 and 3.

J6175 Low/high board jumper. If there is only one 32K System/Program Memory board installed in the Program Section of your development system, set this jumper to position 2. If two 32K System/Program Memory boards are installed in the Program Section, set this jumper to position 2 on one of the boards, and set to position 1 on the other board.

J7171 Extended bank jumper. This jumper must be set to position 1.

S7170 Extended memory DIP switch. All switches must be set to 0 (the ON position).

64K/128K PROGRAM MEMORY BOARD JUMPERS

When the 8086/8088 Emulator Processor is installed, jumpers must be set on each 64K/128K Program Memory board. Refer to the 64K/128K Static Program Memory Installation Manual for information on the location and function of these jumpers.

J7090 Read delay jumper. This jumper must be set to the 0 ns (no delay) position.

J8100--J8160 Address select jumpers. These jumpers must be set such that there is continuous memory from 0--128K. This is done by setting jumper group A to 0, group B to 32K, group C to 64K, and group D to 96K. Refer to the 64K/128K Static Program Memory Installation Manual for information on setting these jumpers.

Section 3

INSTALLATION

INTRODUCTION

This section tells how to install the 8086/8088 Emulator Processor and prototype control probe in your TEKTRONIX microcomputer development system. This section also contains information for connecting the 40-pin probe plug to your prototype circuit.

CAUTION

Before inserting or removing any circuit board, ensure that primary power to the microcomputer development system is OFF. Inserting or removing a board while the power is ON may result in component damage.

CAUTION

Under no circumstances can any other Emulator Processor module be installed in your TEKTRONIX microcomputer development system while the 8086/8088 Emulator Processor module is installed. Excessive power supply loading will result.

NOTE

The 8086/8088 Emulator Processor and the Memory Allocation Controller board cannot be installed in the same microcomputer development system.

INSTALLING THE 8086/8088 EMULATOR PROCESSOR

The 8086/8088 Prototype Control Probe, with its cable termination board, attaches to 8086/8088 Emulator Processor board II. The 8086/8088 Emulator Processor boards, with the prototype control probe attached, can then be installed in your development system. To install the 8086/8088 Emulator Processor, perform the following procedure:

1. Verify that primary power (115 Vac or 230 Vac) to the microcomputer development system is OFF.

2. Remove the cover retainers at the upper rear corners of the mainframe (Fig. 3-1).

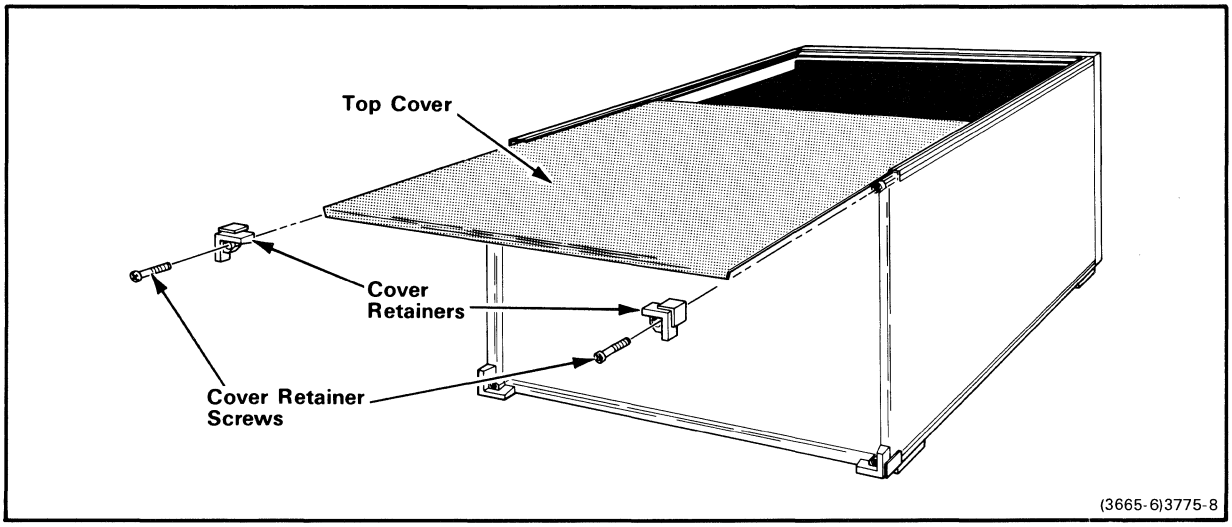


Fig. 3-1. Removal/installation of top cover.

3. Remove the top cover by sliding it straight back, then set the cover aside.

4. Remove the two retaining screws from the cable termination board mounting posts located on board II (see Fig. 3-2).

5. Hold the cable termination board above socket J1 on the back of board II. Make sure the component side of the cable termination board faces away from board II. (Cable connectors J100 and J200 should not yet be connected to the cable termination board.)

6. Guide edge connector P1 of the cable termination board into socket J1 on board II.

7. Install the two retaining screws, removed in step 4, at the upper corners of the cable termination board. Tighten the screws securely.

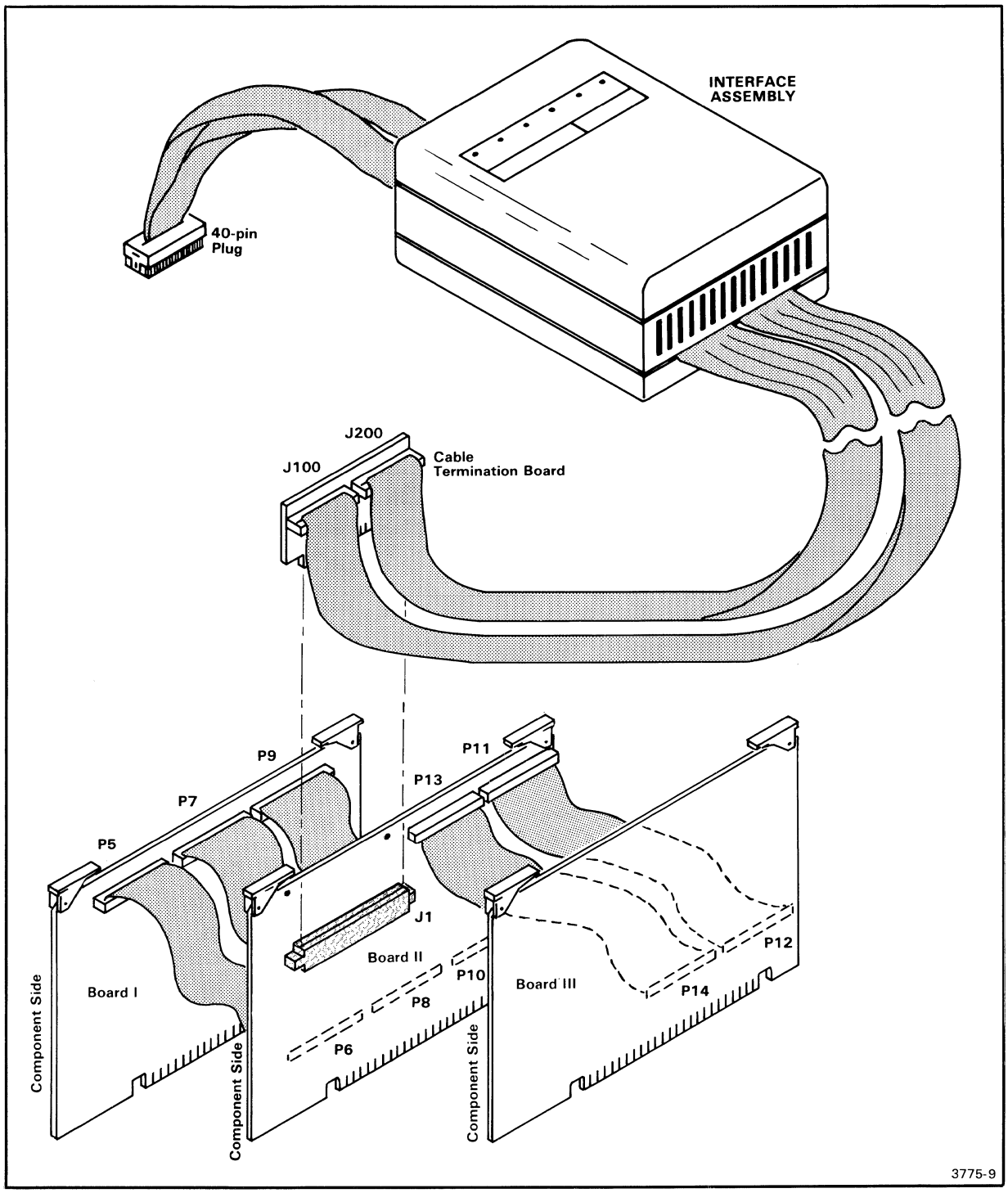


Fig. 3-2. 8086/8088 Emulator Processor boards with prototype control probe.

8. Connect boards I, II, and III together, using the ribbon cables provided. Dress the cables as illustrated in Fig. 3-3.

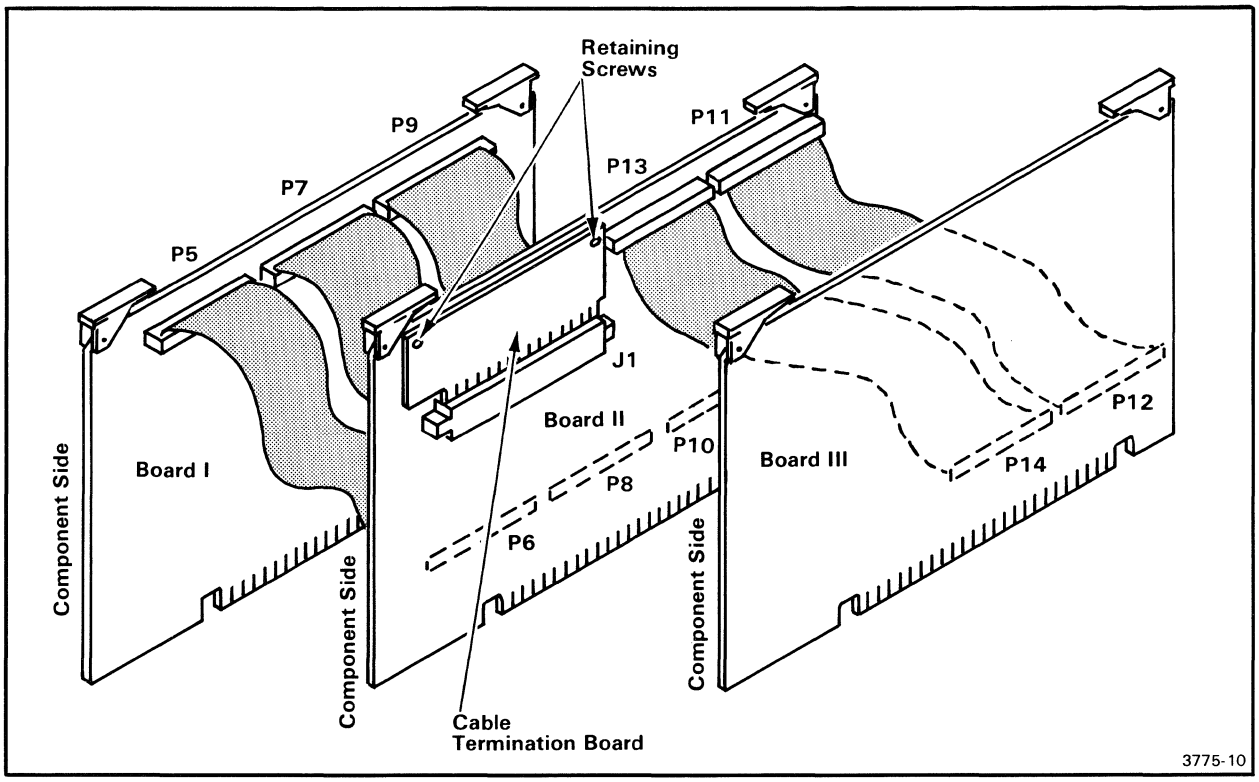


Fig. 3-3. Interconnections of the 8086/8088 Emulator Processor boards.

9. Facing the front of the mainframe, hold the three emulator boards by their upper side edges. With the component sides facing left, align the boards with other circuit boards in the mainframe.

10. While holding all three boards, guide board I down the vertical channel to J14 on the Main Interconnect board. Next, guide board II down the vertical channel to J15, then guide board III into slot J16. Refer to Fig. 3-4 (if your development system is an 8301 MDU) or Fig. 3-5 (if your system is an 8540 IU).

NOTE

When the emulator boards reach their connectors on the Main Interconnect board, do not snap them into place yet. You may need to lift the boards slightly when performing later steps in this procedure.

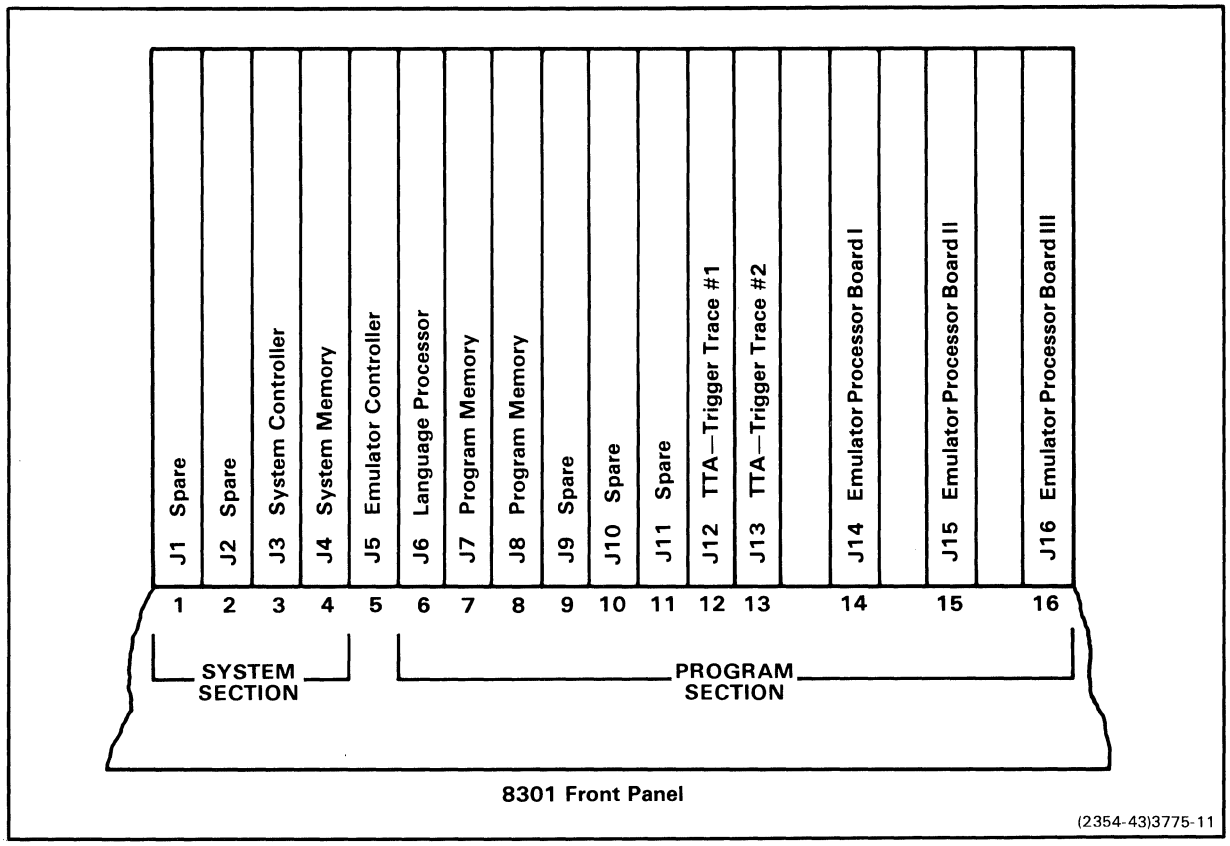


Fig. 3-4. Recommended board arrangement for the 8301 MDU.

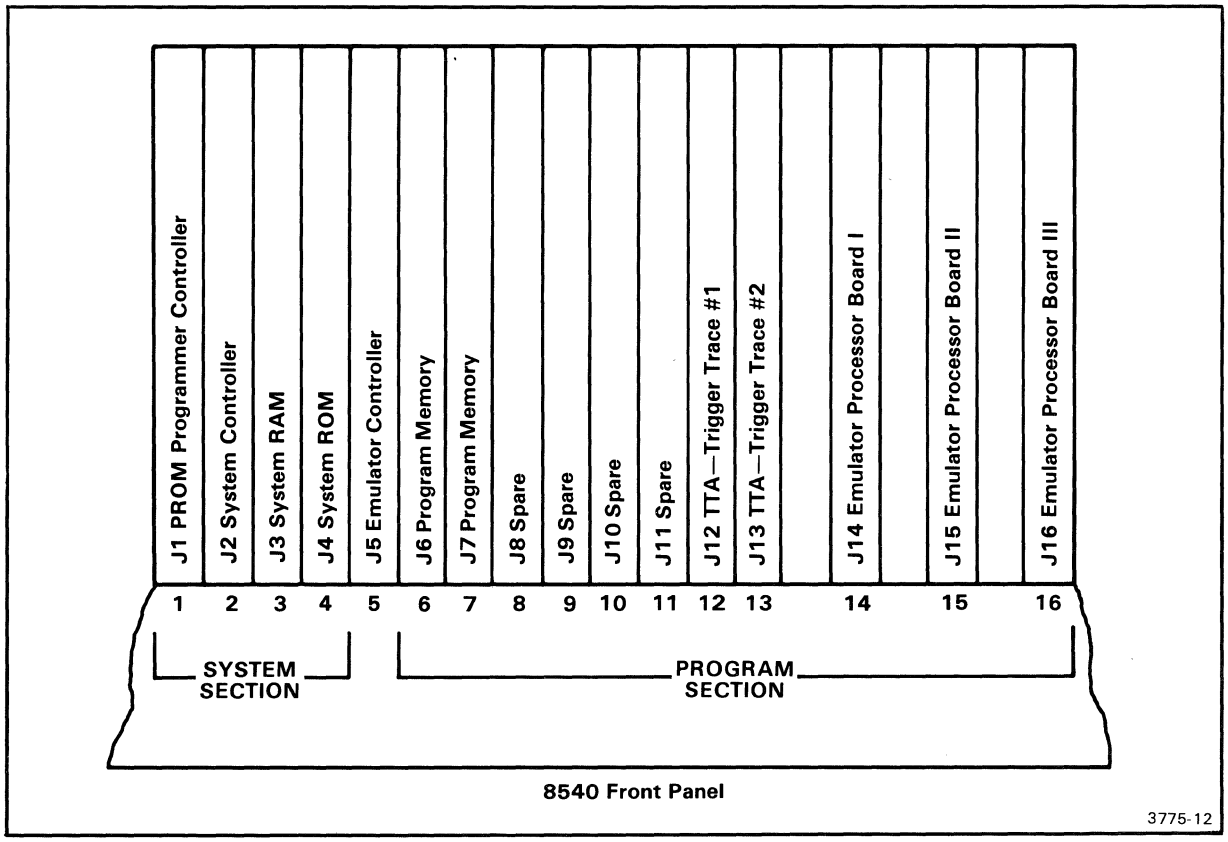


Fig. 3-5. Recommended board arrangement for the 8540 IU.

11. Remove the two mounting screws at the top and bottom of the strain relief plate, as shown in Fig. 3-6. Then remove the strain relief/cable clamp assembly from the rear panel.

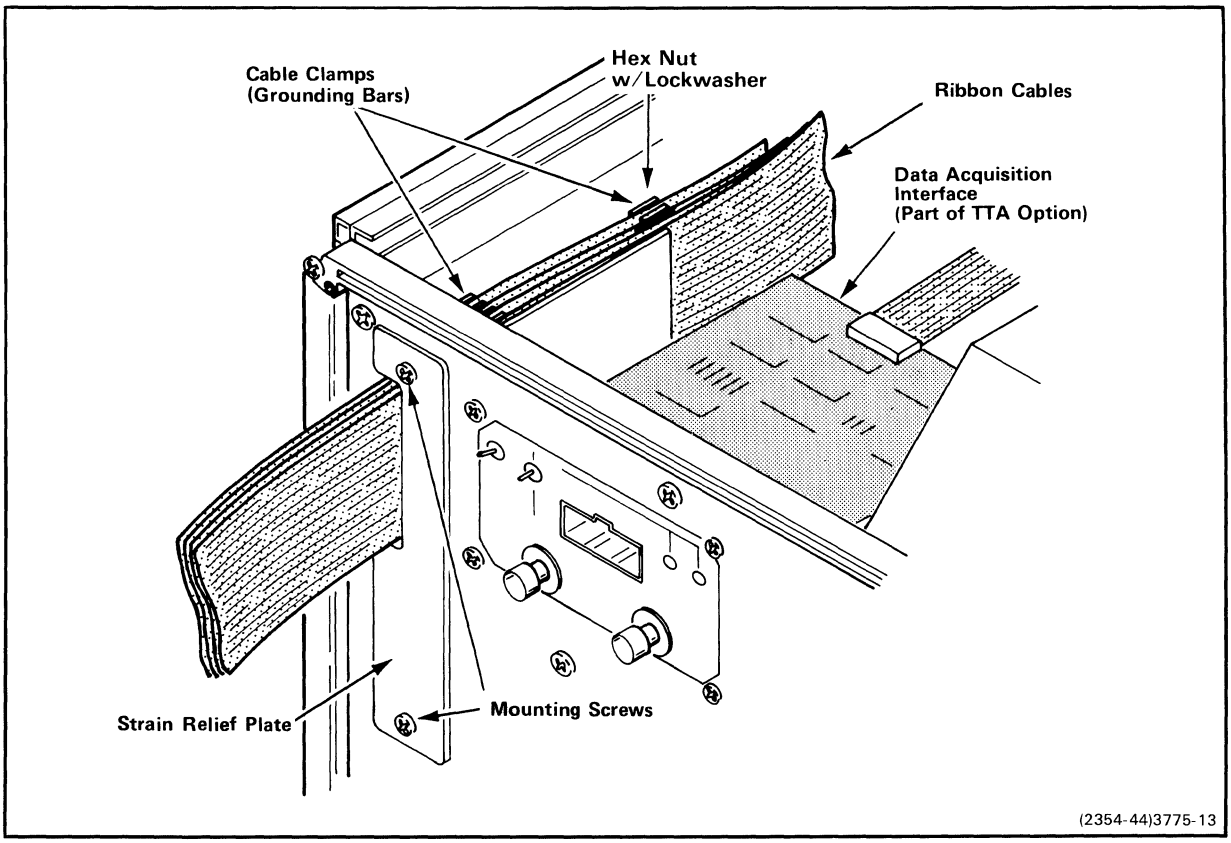


Fig. 3-6. Strain relief plate installation/removal.

NOTE

The standard cable clamps provided with your development system are not compatible with the ribbon cables used with the 8086/8088 Prototype Control Probe. The standard clamps must be replaced with the clamps provided with your 8086/8088 Prototype Control Probe.

12. Ensure that you have allowed enough ribbon cable to reach the cable termination board (already attached to board II, which is now located in the development system's card cage). Then mount the long prototype control probe ribbon cables to the cable clamp assembly, using the new clamps provided. Secure the cable clamps with hex nuts and lock washers. Refer to Fig. 3-7.

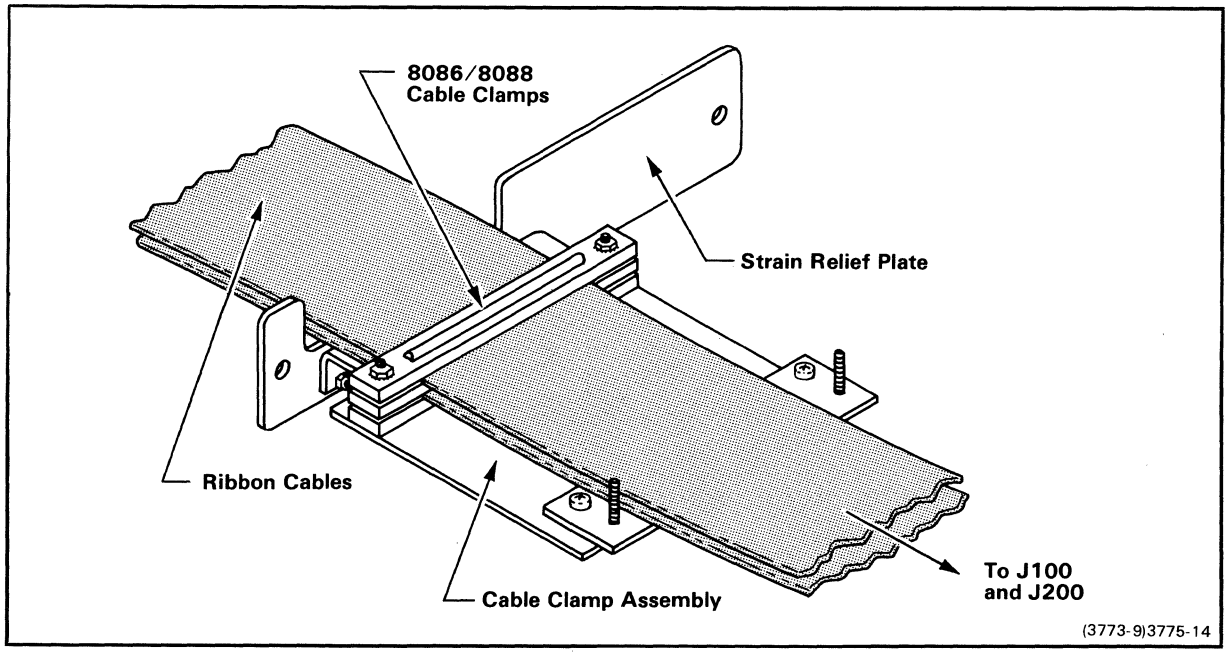


Fig. 3-7. Ribbon cable installation.

13. Feed the prototype control probe cable connectors (J100 and J200) through the cableway opening. Then guide the strain relief/cable clamp assembly into the cableway opening. Attach the strain relief plate to the rear panel, using the two screws removed in step 11.

14. Attach the ribbon cable connector labeled J200 to P200 (refer back to Fig. 3-2). Be sure that pin 1 of the cable connector (blue stripe) and pin 1 of the socket align. (Pin 1 is to the left when viewed from the component side of the board.)

15. Following the procedure of step 14, attach ribbon cable connector J100 to P100 on the cable termination board.

17. Now slide the three emulator boards down until they reach their respective connectors on the Main Interconnect board in your development system's mainframe. Then press down firmly and evenly on the top edges (one board at a time), until each board snaps into place.

18. Dress the cables along the cableway at the side of the mainframe and over the side of the card cage. Make sure the cables are dressed to lie flat, to allow clearance for the top cover.

19. Slide the top cover back into the guide tracks at the top of the mainframe. Be sure the cover is properly seated in the slot at the front of the mainframe.

20. Install the cover retainers at the upper corners on the rear of the mainframe (see Fig. 3-1). Tighten the cover retainer screws securely.

CONNECTING TO THE TRIGGER TRACE ANALYZER (OPTIONAL)

The following procedure explains how to connect the 8086/8088 Emulator Processor to the optional Trigger Trace Analyzer (TTA). Refer to the Trigger Trace Analyzer Installation Manual for further information. Figure 3-8 shows the connection between the TTA and the 8086/8088 Emulator Processor.

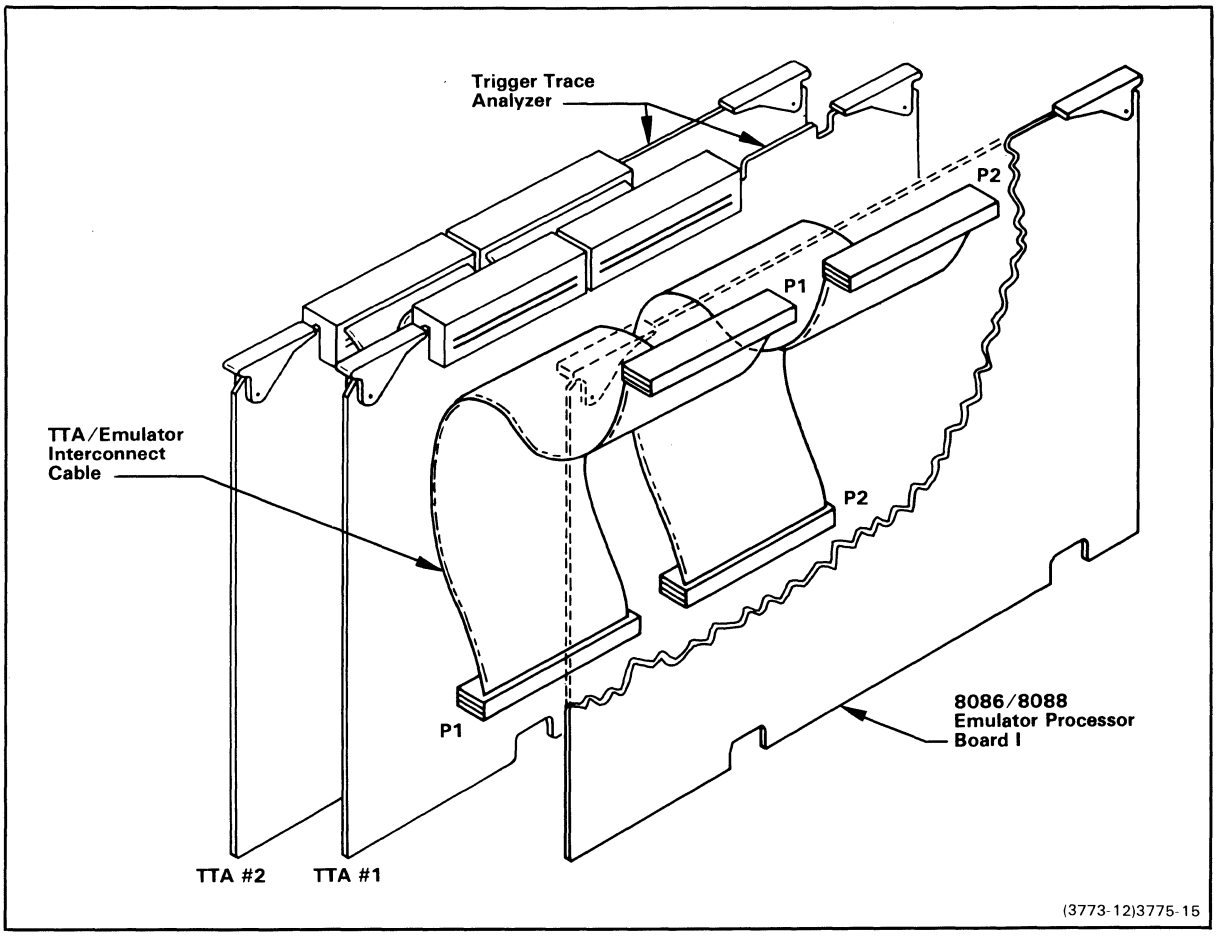


Fig. 3-8. Connecting the 8086/8088 Emulator Processor to the optional Trigger Trace Analyzer.

1. Install the 8086/8088 Emulator Processor in your development system, using the procedures described earlier in this section. (Don't replace the cover of the development system until this entire procedure is completed.)

2. There are two interconnect cables that connect the TTA with the 8086/8088 Emulator Processor. Attach one interconnect cable to P1 and the other cable to P2, on the back of TTA board No. 1.

3. Install the TTA, using the procedures described in the Trigger Trace Analyzer Installation Manual.

4. Attach the two interconnect cables from P1 and P2 of the TTA to P1 and P2 of emulator board I, respectively.

5. Replace the top cover of the development system, using the procedures described earlier in this section.

CONNECTING TO THE PROTOTYPE

The 40-pin plug at the end of the 1.5-foot ribbon cables fits into the 8086/8088 microcomputer socket on the prototype circuit. Pin 1 on the plug must be mated with receptacle 1 on the socket. A notch is located near pin 1 on both the protective spring-loaded plate and the body of the plug, to aid in pin identification (see Fig. 3-9).

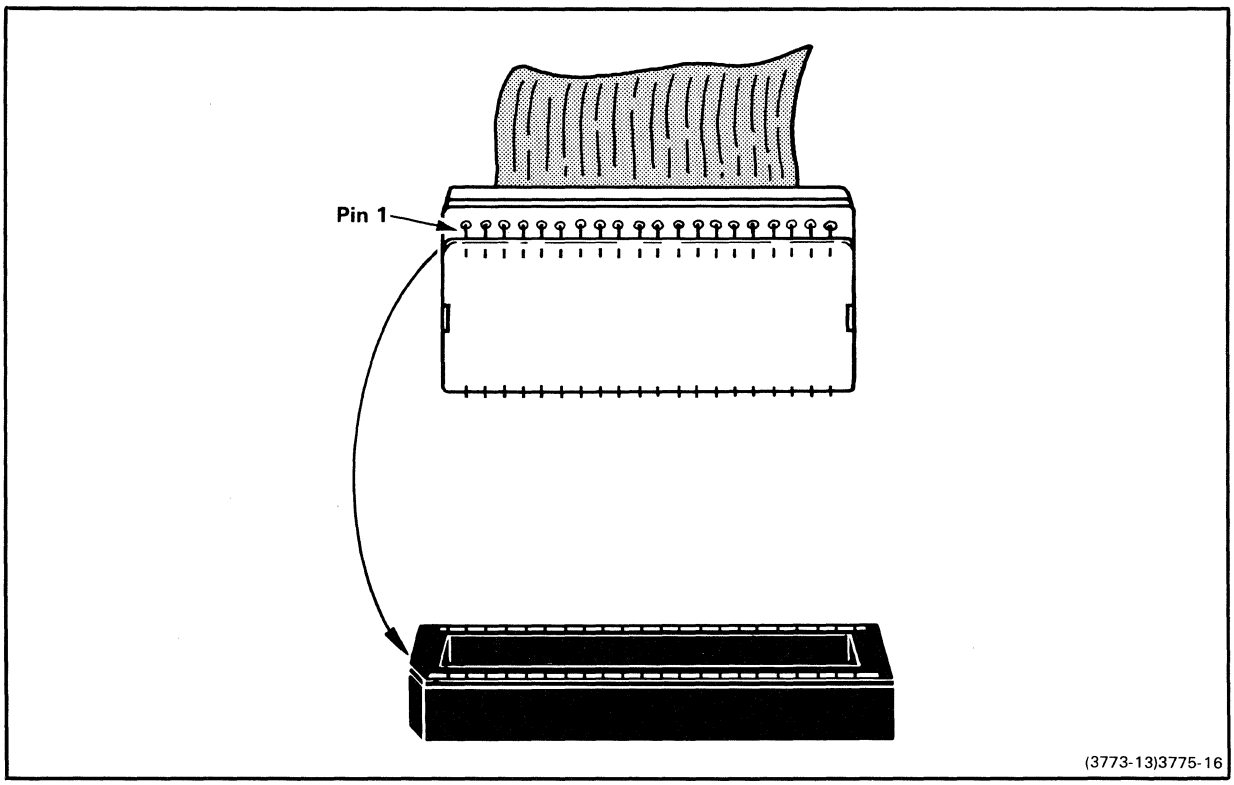


Fig. 3-9. Pin identification and proper plug insertion.

CAUTION

If the prototype control probe plug is incorrectly inserted in the prototype socket, damage to the prototype control probe will result. Figure 3-9 shows the proper method of plug insertion.

If you are using a zero-insertion-force (ZIF) socket for the 8086/8088 microprocessor on your prototype, you should insert a standard low-profile 40-pin DIP socket between the probe plug and the prototype's ZIF socket, to ensure a secure mechanical and electrical connection (see Fig. 3-10).

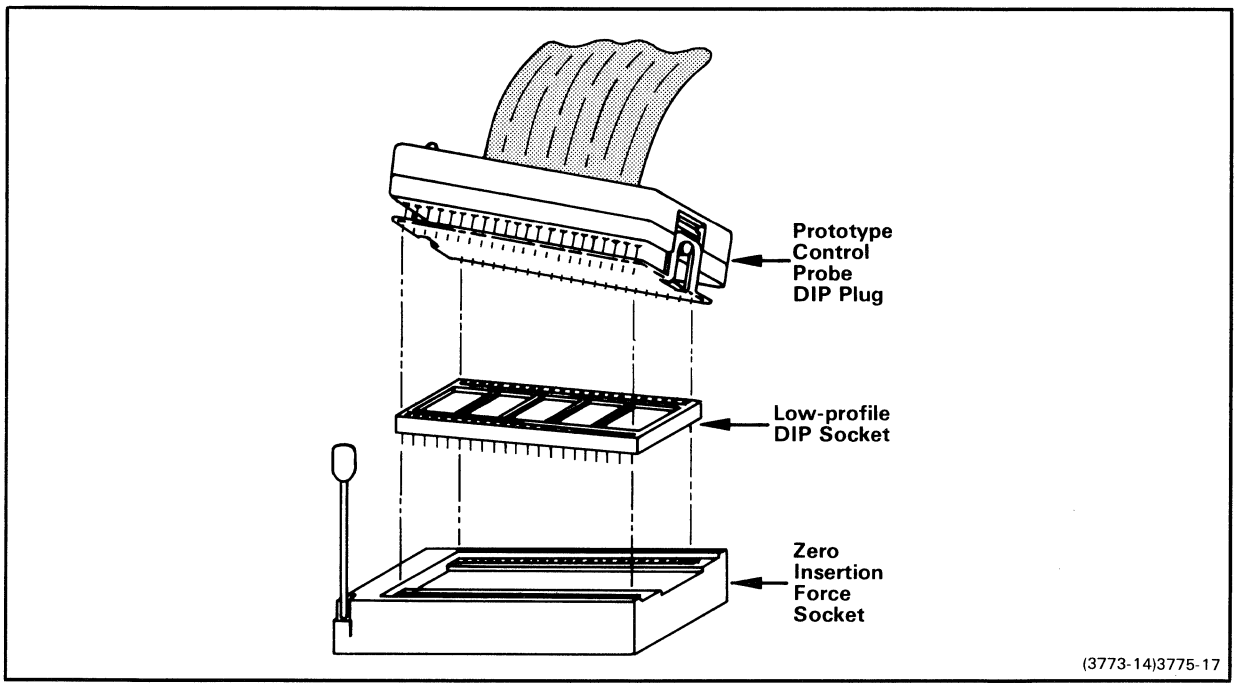


Fig. 3-10. Using a zero-insertion-force socket.

GROUNDING

A proper ground system is necessary for the satisfactory operation of the 8301 MDU or 8540 IU. The emulator processor board and prototype control probe, as well as any other optional and peripheral equipment, must be properly grounded to eliminate ground loops and prevent static discharge damage. Ensure that primary power cords of all units (including the prototype circuitry) are connected to outlets on the same ground system.

Refer to your system's Installation Guide for additional grounding procedures.

INSTALLING 8540 OPTION ROM

When you are installing a new option on your 8540 or installing an 8550-to-8540 Option Conversion Kit, you must install Option ROM devices on the System ROM Board. Figure 3-11 shows the locations and the assigned labels for the 32 ROM sockets on the System ROM board. It is recommended that the Option ROM be installed in the following locations:

- Install the Emulator Option ROM in the sockets labeled CS82—CS8B in Fig. 3-11 (circuit numbers U1010—U1070 and U3010—U3070 on the System ROM board).
- Install the PROM Programmer Option ROM in locations CS90 and CS91 in Fig. 3-11 (circuit numbers U1110 and U1120 on the System ROM board).
- Install the Communications Option (COMM Option) ROM in location CS8F, in Fig. 3-11 (circuit number U4060 on the System ROM board).
- Install the Trigger Trace Analyzer Option ROM in locations CS8E, CS8D and CS8C, in Fig. 3-11 (circuit numbers U4050, U4030 and U4010 on the System ROM board).

The spare ROM sockets for options are limited. When you add or replace Emulator Processor Boards, you may need to remove unneeded ROM to allow installation of required ROM.

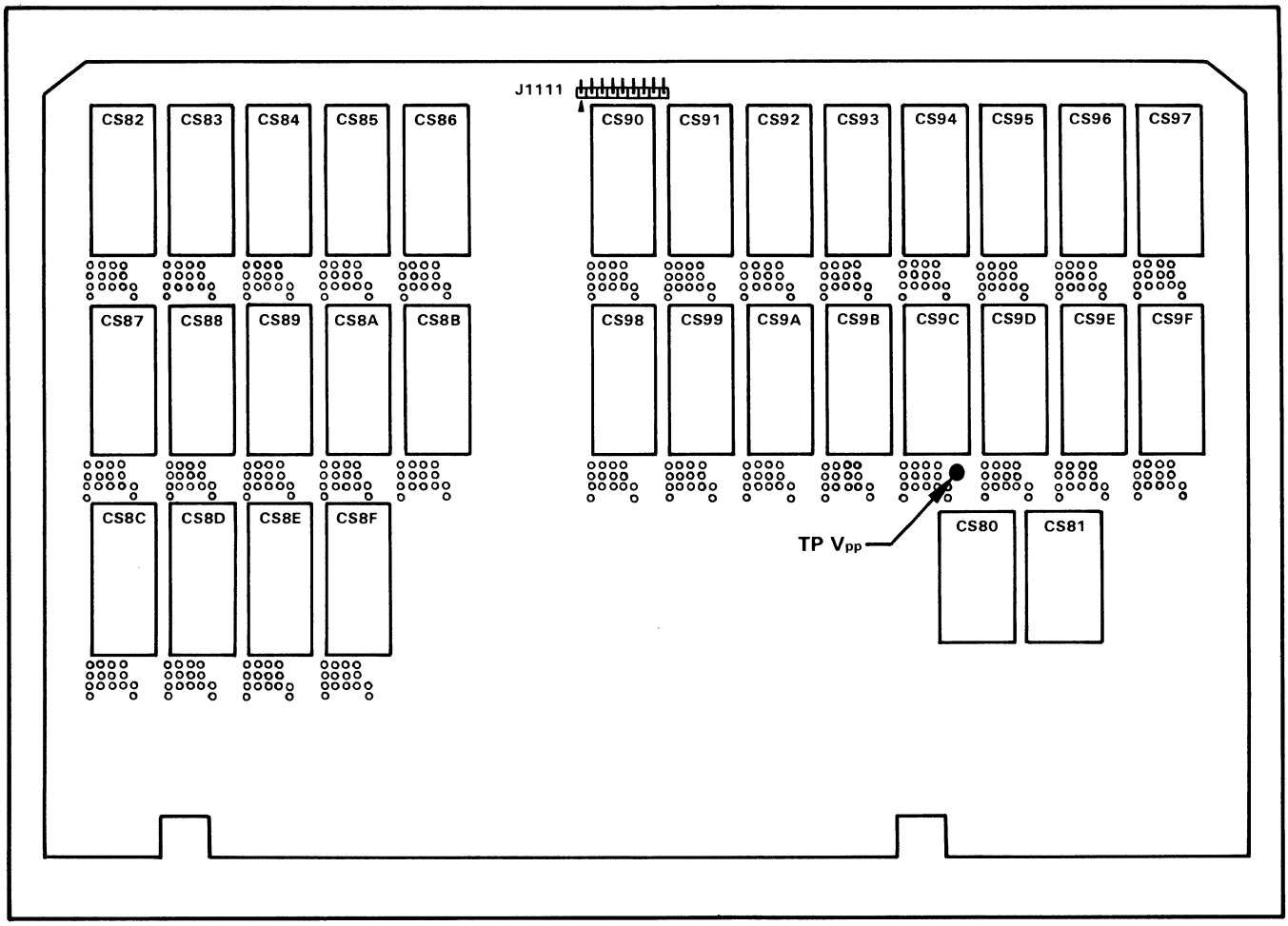


Fig. 3-11. System ROM Board socket locations.

Section 4

PERFORMANCE VERIFICATION

INTRODUCTION

After the 8086/8088 Emulator Processor has been installed in your development system, it should be checked for proper operation. The first part of this section discusses equipment necessary to generally verify that the emulator processor is operating properly. The second part of this section discusses equipment necessary to verify timing relationships of signals at the pins of the prototype control probe.

Every time you install an emulator processor, you should run system verification checks. Emulator processor diagnostics are run automatically as part of the system diagnostic test program. Procedures for running this diagnostic test program are included in your system's Installation Guide.

EQUIPMENT REQUIRED

To check the operation of the installed 8086/8088 Emulator Processor, the following equipment is required:

- TEKTRONIX MicroLab I (067-0892-xx).
- 8086/8088 Personality Card

The MicroLab I checks the 8086/8088 Emulator Processor by providing a circuit with known characteristics (the personality card). The personality card is monitored by MicroLab I circuitry, and test results are indicated on the MicroLab I display. The MicroLab I operating system also contains tests that functionally exercise the prototype control probe.

Throughout this section it is assumed that you are familiar with the MicroLab I and its characteristics. For more information on this equipment, refer to the MicroLab I Instruction Manual and the 8086/8088 Personality Card supplement.

TEST PROCEDURES

EQUIPMENT SETUP

1. Ensure that the power to the development system and to the MicroLab I is turned OFF.

2. Verify that all jumpers are installed correctly on the personality card. (Refer to the 8086/8088 Personality Card supplement.)

3. Install the personality card in the MicroLab I.

4. Attach a standard low-profile DIP socket to the 40-pin plug of the prototype control probe, and insert the plug in the ZIF socket of the personality card.

FUNCTIONAL TEST PROCEDURE

1. Turn ON power to the development system and to the MicroLab I.

2. Start up the operating system. For detailed information on system operation, refer to your System Users Manual.

3. At the system terminal, enter the following command line:

   >SEL 8086 <CR>

   or

   >SEL 8088 <CR>

   This identifies the emulator processor to be tested.

4. Enter the desired emulation mode. Perform step a or b:

   a. To generally verify memory mapping capability, select emulation mode 1. Enter:

      >EM 1 <CR>

      When the prompt character (>) is displayed, enter:

      >MAP U 00000 0FFFFF <CR>

      This transfers all memory to the MicroLab I.

b. If only the operation of the emulator processor is to be tested, select emulation mode 2. Enter:

>EM 2 <CR>

5. To start program execution, first enter:

>RESET <CR>

Then, while holding down the RESET key on the MicroLab I, enter:

>G 0 <CR>

Release the RESET key.

If the 8086/8088 Emulator Processor is operating properly, the MicroLab I will display "HELLO". This display indicates that most of the emulator circuitry is working properly. However, several control lines are not checked during initialization and should be verified with the MicroLab I Processor Tests, which are explained later in this section.

No "HELLO" Display

If the MicroLab I does not display "HELLO", a problem is indicated with the 8086/8088 Emulator Processor boards, the prototype control probe, or the MicroLab I. The following procedure may be used to determine which unit is not working:

1. Turn off the power to the MicroLab I and to the development system.

2. Disconnect the prototype control probe from the ZIF socket of the personality card.

CAUTION

The 8086 or 8088 microprocessor is subject to damage by static discharge when not installed in a socket. Hold the microprocessor by the ends only and do not touch the pins. The microprocessor should be stored in conductive foam when not in use.

3. Install the personality card's microprocessor device in the ZIF socket.

4. Turn on the power to the MicroLab I.

If the MicroLab I now displays "HELLO", the problem is with the 8086/8088 Emulator Processor or the prototype control probe. Refer to the 8086/8088 Emulator Processor Prototype Control Probes Service Manual for servicing information.

If the MicroLab does not display "HELLO", a problem with the MicroLab I is indicated. Refer to the MicroLab I Instruction Manual and 8086/8088 Personality Card supplement for servicing information.

PROCESSOR TEST PROCEDURE

If the emulator processor has passed the Functional Test Procedure, you are ready to run the Processor Tests. While each test is being performed, the display will show "PrOC n" (where n is the number of the test being performed). Perform the following procedure:

1. Press the RESET key on the MicroLab I keypad. This initializes the Processor Test hardware in the MicroLab I.

2. Press the PROC TEST (Shift 1) key to start the Processor Tests. The display will show "Pn".

3. Press the 0 key. The MicroLab I will execute PROC 0 and then display "SPECIAL".

4. If the MicroLab I does not automatically transfer control to PROC 1, press the SPECIAL key. The MicroLab I will perform each of the remaining Processor Tests in order.

Refer to the appropriate personality card supplement to the MicroLab I Instruction Manual for Processor Test error codes.

EMULATOR TIMING VERIFICATION

You may occasionally want to verify timing relationships between the signals at the pins of the prototype control probe. The following paragraphs discuss equipment necessary to perform these timing verifications.

Details of these timing relationships are provided in the appropriate Emulator Specifics section of your System Users Manual.

MEASUREMENT CONSIDERATIONS

Emulator timing verification involves measurement of extremely fast signals. Test equipment used for these measurements should be able to resolve timing differences of less than 5 ns between two signals. A resolution of 1 ns is best for examining the most critical timings.

Be careful that errors are not introduced by the test equipment being used. Test equipment calibration should be checked carefully. If you are using a dual trace oscilloscope rather than a dual beam model, be sure to account for any possible skew between the the two input channels. In general, good laboratory measurement practices should should be followed to ensure accurate results.

Equipment Required

To measure timing relationships with the preferred accuracy and resolution, the following equipment may be used:

- TEKTRONIX 7844 Dual Beam Oscilloscope, or equivalent
- Two TEKTRONIX 7A26 Vertical Amplifiers, or equivalent
- TEKTRONIX 7B85 Delaying Time Base, or equivalent

CONTROLLING THE SIGNAL LINES UNDER TEST

Some processor signal lines, such as interrupt lines, are normally connected to asynchronous circuits. Timing relationships of asynchronous signals may be difficult to measure with an oscilloscope. To exercise these signal lines in a periodic manner, it may be necessary to develop software routines or use an external test fixture such as the TEKTRONIX MicroLab I.

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.